

1. ROTIN, YA. P.
2. USSP 600
4. Okorokov, N. I.
7. Mechanization requirements in the organization of collective farm areas,
N. I. Okorokov, Reviewed by YA. P. Rotin, Sov. kniga, No. 1, 1953.

9. Monthly List of Russian Accessions, Library of Congress, April 1953, Uncl.

ROTINA O.D.
BEREZINSKIY, A.R., prof., doktor tekhn.nauk; ROTINA, O.D., kand.tekhn.nauk;
BOTOVA, Yu.P., red.; VOLKOV, S.V., tekhn.red.

[Use of precast reinforced concrete construction for water supply
and sewerage systems] Primenenie sbornogo zhelezobetona v vodo-
provodnykh i kanalizatsionnykh sooruzheniyakh. Moskva, Izd-vo M-va
kommun. khoz. RSFSR, 1958. 177 p. (MIRA 11:6)
(Sewerage) (Water-supply engineering)
(Precast concrete construction)

MOISEV, G. D., (Eng)

Dissertation: "The Use of Pressure Pipes for Determining Discharges in Water Supply Systems." Cand Tech Sci, All-Union Sci Res Inst of Water Supply, Sewerage, Hydraulic Engineering Structures, and Engineering Hydrogeology (VOOGEO) 15 May 54. Vechernyaya Moskva, Moscow, 5 May 54.

SO: SUN 284, 26 Nov 1954

ACC NR: AP7002085

SOURCE CODE: UR/0103/66/000/012/0016/0028

AUTHOR: Rotina, V. Yu. (Moscow)

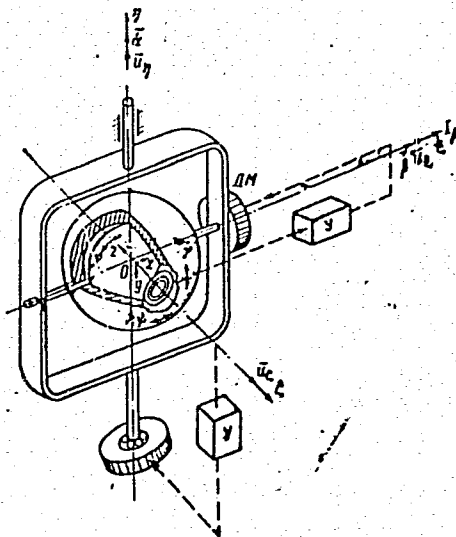
ORG: none

TITLE: One automatic control system in which output parameters are controlled on the basis of indirect measurements

SOURCE: Avtomatika i telemekhanika, no. 12, 1966, 16-28

TOPIC TAGS: automatic control system, automatic control R and D, gyroscope, *GYROSCOPE SYSTEM, AUTOMATIC CONTROL EQUIPMENT*

ABSTRACT: The dynamics of a spherical gyro acting as an automatic control system that is sensitive to random disturbances is considered. A spherical rotor (see figure) placed in a spherical supporting cup is spun by the stator magnetic field (induction motor principle). At a certain speed, the rotor will float in the cup; the latter is fastened to the internal gimbal. Precision servos continuously align the external and internal gimbal axes



Card 1/2

UDC: 681.2.082.16 - 503.53

ACC NR: AP7002085

with the axes perpendicular to the sphere rotation axis. A delay in the alignment process manifests itself as a drift. The drift may be caused by dynamic errors in the real servos and by disturbances acting directly on the sphere. The optimization criterion is connected with characteristics of the drift: the control of the gyro servo system is optimal when the mean-square drift is minimal. Measurable relative angles between the sphere and the internal gimbal serve as control inputs. By using Lagrange equations of the second kind, a mathematical model of the above system is set up; optimal control laws of a two-channel system are described in terms of matrices and integral equations, and a block diagram of the gyro control system is worked out. The case of a single-channel system is also considered. "The author wishes to thank A. Yu. Ishlinskiy and V. S. Pugachev for their valuable advice in carrying out this work." Orig. art. has: 5 figures and 95 formulas.

SUB CODE: 09, 13 / SUBM DATE: 20May66 / ORIG REF: 003 / OTH REF: 001

Card 2/2

8(6)

SOV/91-59-10-21/29

AUTHOR: Rotinov G.A. Engineer

TITLE: An Accident at Work on a Switched-Off Line of a Double-Circuit 220 kw Electro-Transmission

PERIODICAL: Energetik, 1959, Nr. 10, pp 30-31, (USSR)

ABSTRACT: Most accidents are a result of violation of the prescribed safety regulations. Many cases of such violations take place particularly when operating electrical installations. Thus, in 1958, 54% of heavy accidents happened as a consequence of a number of workers being struck by an electric current. As an example, an accident that occurred when doing repair work on an air electro-transmission line, is given. For the purposes of repair, one line of a double-circuit 220 kw electro-transmission was switched-off; at the substations it was not grounded. A repair brigade consisting of an electrical fitter IV group - the superintendant of work-and two fitters of the II and I group, who had to do the work, was previously instructed by its chief to provide the protective groundings. The superintendant climbed the support and began

Card 1/2

SOV/91-59-10-21/29

An Accident at Work on a Switched-Off Line of a Double-Circuit
220 kw Electro-Transmission

to disconnect the line, without having it grounded. He was instantly killed by the current induced from the other working line. After the accident, the measurements disclosed that the tension between the phase and the ground was 0.9-1 kw when the switched-off line was grounded, and 6 kw when it was not grounded.

Card 2/2

ROTIKOV, G. A.

PA 55/49T38

USSR/Electricity
Hydroelectric Stations
Generators

Apr 49

"Breakdown of a Hydrogenerator of the 'Elektrosil'
Works," G. A. Rotikov, Engr, 1 p

"Elek Stants" No 4

Describes damage to 15,600 kva, 6.3 kv generator
which caught fire after short-circuit on non-
reactive feeder. Gives details of damage. Break-
down was due to inadequate bracing of the active
steel on the stator frame (same condition was
found on another generator of same type). Points

FDD

55/49T38

USSR/Electricity (Contd)

Apr 49

to Gross Violation of "Rules for Commercial
Operation" in addition to above defect.

FDD

55/49T38

1ST AND 2ND ORDERS																										3RD AND 4TH ORDERS																									
PROCESSES AND PROPERTIES INDEX																										IND AND 5TH ORDERS																									
<p>ROBINSON, A. L.</p> <p>BC</p> <p>Also in U-1614, 3 JAN 1952</p> <p>Kinetics of redox potentials. I-III. A. L. ROBINSON (J. Gen. Chem. Russ., 1939, 9, 1182-1187, 1188-1197, 1198-1206).—I. Stabilization of the redox potentials of mixtures of H_2AsO_4 and H_2AsO_3 (in presence of KI) can be attained in acid, but not alkaline, solutions.</p> <p>II. With a cathode-polarised Pt electrode, the time required for stabilisation of the potential of the system falls with rising $[H^+]$ and $[I^-]$, and with increasing $[As^{III}]/[As^{V}]$; it is expressed by $\tau = a([H_2AsO_4]/[H_2AsO_3])^{-b}$, where a and b are consts. τ is least for platinised glass electrodes.</p> <p>III. For oxidised Pt electrodes $\tau = a - b \log [H_2AsO_4]/[H_2AsO_3]$, irrespective of the oxidation method applied. The E_s is $\propto [H^+]$ of the layer of electrolyte at the surface of the electrode. R. T.</p> <p>Leningrad Industrial Institute</p> <p>ASH-SLA METALLURGICAL LITERATURE CLASSIFICATION</p>																																																			

1ST AND 2ND ORDERS										PRECEDENCE AND PRIORITY										3RD AND 4TH ORDERS									
<p>ROTYNAN, A. L.</p> <p>Also in U-1610, 3 Jan 1952</p> <p>The oxidation-reduction potential of iodine</p> <p>Rotinyan and I. I. Appenin. <i>J. Gen. Chem.</i> (U. S. S. R. 10, 1524-5(1940); cf. <i>C. A.</i> 34, 940).—The object of the expts. was to det. why the oxidation-reduction potentials of the system I_2/I^-, investigated by Rusanova (<i>C. A.</i> 33, 1854-9), are consistently more electropos. by approx. 10 mv. than those found in the Landolt-Börnstein-Itzhak-Scheel Tabellen. The $e.m.f.$ of the cell $Pt, Cl_2, Cl, 0.1 N KCl, 0.1 N KI, Hg_2Cl_2/Hg$ at 25° ± 0.2 and 10 ± 0.1 were measured with an accuracy of ± 0.1 mv. The initial concns. of I_2 and KI in mols./l. and the obtained $+E_h$ in mv. (at 25°) are, resp.: 5.08×10^{-2}, 1.08×10^{-3} and 607.8; 5.09×10^{-2}, 1.08×10^{-3} and 593.0; 7.22×10^{-2}, 1.08×10^{-3} and 596.1; 5.09×10^{-2}, 1.08×10^{-3} and 590.4; 1.58×10^{-2}, 1.012×10^{-3} and 585.0; 1.58×10^{-2}, 1.00 and 620.2; 7.55×10^{-2}, 2.128×10^{-3} and 680.1. It is concluded that the results of Rusanova are erroneous, probably owing to some systematic error in the measurements. Five references.</p> <p>W. R. Henn</p> <p>Lab. of Phys. Chem., Novosibirsk Industrial Inst.</p>																													
<p>AND U.S.A. METALLURGICAL LITERATURE CLASSIFICATION</p>																													

1ST AND 2ND SERIES										PROCESS AND PROPERTIES INDEX										3RD AND 4TH SERIES									
<p>ROTINYAN, A.L.</p> <p>BC</p> <p>B-3-1</p> <p>Treatment of platinum electrodes used for determining the redox potential of soil. A. L. Rotinjan (Kolloid. Zhurn., 1941, 7, 35--38).--Geller's views (of. B, 1940.III, 61) are criticised. He took no account of gas films on the surface of polarised electrodes.</p> <p>J.J.B.</p>																													
<p>ASA-55A METALLURGICAL LITERATURE CLASSIFICATION</p>																													
<p>1 2 3 4 5 6 7 8 9 10</p>										<p>11 12 13 14 15 16 17 18 19 20</p>										<p>21 22 23 24 25 26 27 28 29 30</p>									

1ST AND 2ND ORDERS										3RD AND 4TH ORDERS									
<p>C. A. ROTINYAN, A.L.</p> <p>PROCESSES AND PROPERTIES INDEX</p> <p>The kinetics of oxidation-reduction potentials. A. L. Rotinyan. <i>Doklady Akad. Nauk S.S.S.R.</i> 46, 65-70 (1945); <i>Compt. rend. acad. sci. U.R.S.S.</i> 46, 60-3 (1945) (in English).—Graphs are presented showing the change in electrode potential, E, occurring during the first 12 min. after immersion of a Pt electrode satd. with H in aq. solns. contg. $Ti_2(SO_4)_3$ (0.3125×10^{-4} to 6.250×10^{-4} M), Ti_2SO_4 (0.16625×10^{-4} to 3.125×10^{-4} M) and H_2SO_4 (0.0087 to 0.174 M) held at 35°. There are 3 distinct stages in establishment of equil. which are characterized by different factors retarding establishment of the electrode equil., $Ti^{3+} + 2H(adsorbed) \rightleftharpoons Ti^{2+} + 2H^+$. During the first stage, when $C_{Ti^{3+}} \ll C_H$ at the Pt electrode surface dE/dt plotted against concn. of thallic ion in the soln. gave a straight line whose slope varied somewhat, probably because of differences in catalytic activity of different electrodes (cf. <i>C.A.</i> 34, 5724). During the final stage of equil. establishment, when $C_{Ti^{3+}} \gg C_H$ at the electrode, the reaction was, resp., first order or second order with respect to adsorbed H, depending on whether the electrode had less or greater catalytic activity. The less-active electrode catalyzed only one of the two stages of the reaction involving adsorbed H. The more active electrode catalyzed direct reduction of Ti^{3+} to Ti^{2+} by 2 atoms of adsorbed H.</p> <p>J. W. Perry.</p>																			
<p>ASH-SLA METALLURGICAL LITERATURE CLASSIFICATION</p>																			
<p>REGIONAL SYMBOLOGY</p>										<p>REGIONAL SYMBOLOGY</p>									
<p>GROUPS</p>										<p>GROUPS</p>									
<p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20</p>										<p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20</p>									

Kinetics of oxidation/reduction potentials. IV. A. L.

Rozhnova, I. I., Appen, and V. G. Tkachenko. *J. Gen. Chem.* 1961, 35, 1612 (1946) (in Russian); cf. *Chem. Abstr.* 55, 1612 (1946).C.A.B. 34, 912. (1) Reproducible potential-time curves in the Tl^{++}/Tl^+ system (e.g. $Tl_2(SO_4) \cdot 2.50 \times 10^{-4} M$, H_2SO_4 0.25 $\times 10^{-2} M$, H_2SO_4 0.174 M) could be obtained after repeated "training" of the Pt-foil electrode(consisting of alternating successive cathodic polarizations in H_2SO_4 (50 ma. for 20 min.) and immersions in the oxidation-reduction system), the better the higher the concentration in Tl^{++} and the less the exposure of the electrode to airbetween expts. Abnormal rates of establishment of the equil. potential occurred either due to passivation, manifesting itself in an induction period at around +0.9 v. and removable by thorough rinsing, or due to activation by O_2 , especially by anodic polarization or immersion in HNO_3 or CrO_3 ."Training" of the electrode evidently suppresses both passivation and activation; with trained Pt, the rate of establishment of the potential is practically unaffected by stirring of the soln. (2) At const. $[Tl_2(SO_4)] = 3.125 \times 10^{-4} M$ and const. $[H_2SO_4] = 0.174 M$, the period τ of establishment of the equil. potential increased with decreasing $[Tl_2(SO_4)]$, example, 6.25×10^{-4} , 2.188×10^{-4} , $0.625 \times 10^{-4} M$, $\tau = 2.4, 3.6, 12.5$ min. and 1.5, 2.0, 7.3 min., with Pt foil 0.1 and 0.05 mm. thick, resp. On the other hand, 100-fold variation of $[Tl_2(SO_4)]$ at const. $[Tl_2(SO_4)]$ had no effect on τ . On diln., at const. Tl^{++}/Tl^+ (SO₄)₂ had no effect on τ . The variation of τ is detd. solely by and const. acidity, the variation of τ is detd. solely by $[Tl_2(SO_4)]$, example, Pt 0.1 mm. thick, initial $[Tl_2(SO_4)]$ $1 \times 10^{-4} M$, $[Tl_2(SO_4)]$ $0.25 \times 10^{-4} M$, diln. 1:1, 1:8, 1:32, $\tau = 1.9, 6.6, 23.0$ min. (at H_2SO_4 0.174 M). With increasing acidity, the reaction is slowed down, faster than linearly. Rising temp. accelerates it linearly, example, Pt 0.1 mm., $Tl_2(SO_4) \cdot 2.5 \times 10^{-4} M$, Tl_2SO_4 $0.625 \times 10^{-4} M$.of a slope proportional and a length inversely proportional to $[Tl^{++}]$; the second type of curve (0.1 mm. thick Pt) has a branch convex to the time axis. (5) Empirically, $\tau = a[Tl^{++}]^{-b}$; however, even with equal thickness of the Pt foil, and all other conditions being equal, a and b vary from series to series; hence, the differences of rate found with various thicknesses of Pt are not due to diffusion of H but to differences in the surface condition.(6) The rate-detg. step is most probably the removal of adsorbed H by $Tl^{++} + 2H \rightarrow Tl^+ + 2H^+$. N. T.

SIZE AND PROPERTIES INDEX

0, 12.5, 25, 35°, $\tau = 10.6, 7.7, 4.6, 2.2$ min. (3) The normal equil. potential Tl^{++}/Tl^+ at 25° is $E_0 = +1.101$ v., its variation between 0 and 25°, $E_0 = 1.132 + 0.0021$ v., between 25 and 35°, the temp. coeff. is 0.0021 v./degree, higher than for the nitrates (0.0015 v./degree).(4) Kinetic curves (potential against time) are of two types, both starting with a steeply rising linear portion up to about +0.9 v. coinciding with beginning adsorption of O_2 ; this is followed, in curves of the first type, observed with the thinner Pt foils (0.05 mm.), by a less steep linear branchof a slope proportional and a length inversely proportional to $[Tl^{++}]$; the second type of curve (0.1 mm. thick Pt) has a branch convex to the time axis. (5) Empirically, $\tau = a[Tl^{++}]^{-b}$; however, even with equal thickness of the Pt foil, and all other conditions being equal, a and b vary from series to series; hence, the differences of rate found with various thicknesses of Pt are not due to diffusion of H but to differences in the surface condition.(6) The rate-detg. step is most probably the removal of adsorbed H by $Tl^{++} + 2H \rightarrow Tl^+ + 2H^+$. N. T.

ROTINYAN, A. I.

10a-21. Rapid Determination of Copper in a Nickel Electrolyte.
(In Russian.), V.V.Drozdev, E.S. Kozich, and A.I. Rotinyan. Zavodskaya
Laboratoriya (Factory Laboratory), v. 13, Oct. 1947, p. 1256.

Compares volumetric methods - one direct and other indirect.

immediate source clipping

RUSSIAN AND ENGLISH INDEX																									
RUSSIAN													ENGLISH												
<p>Slime formation and anodic behavior of palladium in the electrolysis of copper anodes containing varying amounts of sulfur. B. V. Drozdov and A. I. Rotinyan. <i>Tsvetnye Met.</i> 20, No. 8, 51-3 (1947).—The behavior of Pd in Cu anodes contg. 0.04-0.06% of S was studied. The Pd content in the anodes was 0.073-0.001%. The electrolyte contained Cu 35 and H₂SO₄ 175 g. l., the temp. was 50°, and the potential 0.1 v. The amt. of anodic slime formed increased with the S content in the anodes and with anodic c.d. At S contents of 0.20-0.25%, Pd partly dissolves and collects on the cathode. When the S content is above 0.25%, Pd remains entirely in the slime. M. Hosh</p>																									
<p>ASH-SLA METALLURGICAL LITERATURE CLASSIFICATION</p>																									
<p>1304 834179</p>																									

1ST AND 2ND ORDERS										2ND AND 4TH ORDERS									
PROCESSES AND PROPERTIES INDEX																			
<p>ROTINYAN, A. L.</p> <p>Kinetics of the swelling of hard coal in pyridine. A. L. Rotinyan. <i>Zhur. Priklad. Khim.</i> (J. Applied Chem.) 21, 751-4(1948).—The nonapplicability of a 1st-order kinetic law to the exptl. data of Kuznetsov and Dybskii (C.A. 42, 5205f) is due to their representation by the simple diffusion equation $dx/dt = (DS/\lambda)(a - x)$, where x = amt. of solvent consumed at time t, D = diffusion coeff., S = surface area, and the thickness λ of the solvated layer of the coal grain is considered const. If that implausible simplification is abandoned, and it is assumed that λ grows proportionally to x, i.e. $\lambda = bx$, the equation becomes $dx/dt = (DS/b)[(a - x)/bx]$. On the other hand, treatment of the process as a purely chem. reaction of the 1st order in $(a - x)$ but inhibited by the accumulation of solvated micelles, gives $dx/dt = k(a - x)/x$. Either equation is of the form $dx/dt = A(1/x) - B$, and this is confirmed by the linearity of the exptl. dx/dt as a function of $(1/x)$ which holds for all coal specimens investigated by K. and D. The mechanism of swelling of aged and of young coal types is the same, the only difference lying in the value of D or in the true surface area, or in both these factors.</p> <p style="text-align: right;">N. Thou</p>																			
<p>438.31.4 METALLURGICAL LITERATURE CLASSIFICATION</p>																			

ROTIANYAN, A. L.

PA 11/49T36

USSR/Chemistry - Salts, Fused
Chemistry - Electrolysis

Jul 48

"Current Expenditure in the Electrolysis of Fused Salts," A. L. Rotinyan, 10 pp.

"Zhur Priklad Khimii" Vol. XXI, No 7 - pp 755-64

Rotinyan's object is to deduce working formulas from theoretical considerations and check them with data of other researchers. Shows defects of Abramov's formulas. Deduces equations showing how efficiency of electrolysis is affected by current density, distance between electrodes, and temperature. Submitted 10 Jan 48.

11/49T36

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ROTYNAN, A.L.
 PROCESSES AND PROPERTIES INDEX

Velocity of the reaction between hydrogen sulfide and certain metal oxides. A. L. Rotynan, *Zhur. Priklad. Khim.* (J. Applied Chem.) 21, 807-8 (1948).—The kinetics of the reaction between gaseous H_2S and solid HgO , MnO , or PbO (in grains of 1.5-2.0 mm.) are derived from the exptl. data of P'yankov and Druzhinin (C.A. 42, 1483d), on the assumption of a 1st-order chem. reaction, of rate const. k , occurring at the surface of the grains, followed by further reaction between the H_2S diffusing with a diffusion coeff. D , through a sulfide rind of growing thickness λ , and the progressively shrinking oxide core of the grain. The rate of consumption of gaseous H_2S from the space, $-d(a-x)/dt = dx/dt = ks$, where, by the quasi-stationary method of Frank-Kamenetskii (C.A. 34, 7007'), the surface concn. of H_2S , $s = (a-x)/(k\lambda/D) + 1$. Integration under the assumption of linear growth of λ , i.e. $\lambda = bt$, gives $1/t = \{(2.3/1) \log [a/(a-x)]\} - \beta(x/t)$, where $\beta = kb/(D + kba)$, and $1/t = kD/(D + kba)$. The validity of this treatment, involving commensurable chem. reaction and diffusion, for the 3 reactions HgO (yellow) + $H_2S \rightarrow HgS + H_2O$; $MnO + 2H_2S \rightarrow MnS + S + 2H_2O$, and $PbO + 2H_2S \rightarrow PbS + S + 2H_2O$, is demonstrated by the linearity of $(1/t) \log [a/(a-x)]$ as a function of (x/t) which holds in all 3 cases, with t in min. and x in moles/mole O_2 in the oxide. In these units, the straight lines for HgO and MnO merge into one, and the line of PbO passes only a little below it. Examples of data are: MnO , ($a = 2$), 1, 13, 80 min., $(x/t) = 1.000, 0.100, 0.000$, and $(1/t) \log [a/(a-x)] = 0.328, 0.039, 0.012$; PbO , ($a = 2$), 1, 13, 80 min., 0.640, 0.078, 0.026, and 0.167, 0.024, 0.009. The 1st order of the chem. reaction is in keeping with the reaction equation. In the case of MnO and PbO , it means that the over-all reaction is actually a sequence of two 1st-order steps, of the type $MnO + H_2S \rightarrow MnO + S + H_2O$, and $MnO + H_2S \rightarrow MnS + H_2O$. The fact that the coeff. k is practically the same in all 3 cases indicates that the solid sulfide rind is porous and offers no significant resistance; the slowing down can only be due to the H_2O plugging up the pores. N. T.

ASAC-11A METALLURGICAL LITERATURE CLASSIFICATION

130000 131000 132000 133000 134000 135000 136000 137000 138000 139000 140000 141000 142000 143000 144000 145000 146000 147000 148000 149000 150000 151000 152000 153000 154000 155000 156000 157000 158000 159000 160000 161000 162000 163000 164000 165000 166000 167000 168000 169000 170000 171000 172000 173000 174000 175000 176000 177000 178000 179000 180000 181000 182000 183000 184000 185000 186000 187000 188000 189000 190000 191000 192000 193000 194000 195000 196000 197000 198000 199000 200000 201000 202000 203000 204000 205000 206000 207000 208000 209000 210000 211000 212000 213000 214000 215000 216000 217000 218000 219000 220000 221000 222000 223000 224000 225000 226000 227000 228000 229000 230000 231000 232000 233000 234000 235000 236000 237000 238000 239000 240000 241000 242000 243000 244000 245000 246000 247000 248000 249000 250000 251000 252000 253000 254000 255000 256000 257000 258000 259000 260000 261000 262000 263000 264000 265000 266000 267000 268000 269000 270000 271000 272000 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ROTINYAN, A.L.

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*Kinetics of a Substitution Reaction on Raney Nickel Powder and the Nature of the Activity of the Skeleton Catalyst. A. L. Rotinyan, B. V. Drozdov, and T. M. Kogan (*Zhur. Priklad. Khim.*, 1948, 21, (8), 810-815). — [In Russian].
Raney nickel (used as a catalyst in organic chemistry) was prepared as a pyrophoric powder from the alloy NiAl₃ by repeatedly leaching out the aluminium with cold alkali, and finally washing. The powder contained 0.6% aluminium; microscopic examination showed that whilst some grains had exfoliated with the formation of pores and cracks, the particle surface area was similar to that of electrolytic nickel powder (0.8 m.²/g., by adsorption of nitrogen at liq.-air temp.). This, and other evidence, indicated that not surface area but the presence of adsorbed hydrogen was responsible for the activity of the Raney nickel (or "skeleton" catalyst). Careful drying reduced the activity of the catalyst; rapid heating burned out adsorbed hydrogen quickly, raising the powder to incandescence. After cooling, it had almost lost its activity, although the particle size was less. The kinetics of the cementation reaction $\text{Ni} + \text{Cu}^{2+} \rightarrow \text{Ni}^{2+} + \text{Cu}$ at 70 °C. were studied, using the Raney nickel. Various samples of the catalyst were added to a typical bath for the electrolytic refining of nickel, containing 1 g./l. Cu, 200 g./l. NiSO₄·7H₂O, 40 g./l. Na₂SO₄, 20 g./l. H₃BO₃, 5 g./l. NaCl. For each equivalent of copper, two equivalents of nickel were added. Complete removal of copper was effected by nickel containing much hydrogen; 95% was removed by powder from which the hydrogen had been carefully removed, but only 25% by "burnt-out" powder. The kinetics of the cementation process may be determined by the velocities of the chemical reaction (which follows a first-order law) and/or the diffusion of copper ions to the nickel surface. A general equation is derived covering all three cases. It includes a coeff. β , which may have values between the limits 0 and 1. The powder

Nickel in hydrogen obeyed the first-order law ($\beta = 0$) initially, although towards the end of the reaction diffusion began to play a part in some cases. Purely diffusion kinetics ($\beta = 1$) were frequently observed with electrolytic nickel powder, but not once with the Raney nickel. With the "burnt-out" powder both the diffusion rate and reaction rate are important ($0 < \beta < 1$). The falling off in the reaction rates is due to the formation of layers of the cemented deposit. - E. V. E. T.

PA 11/49T26

USSR/Chemistry - Reaction Kinetics, of Aug 48
Hydrogen Sulfide
Chemistry - Reduction, Of Metal and
Oxides

"The Speed of the Reaction of Hydrogen Sulfide With
Some Oxides of Metals," A. L. Rotinyan, Lab Phys
and Colloidal Chem, First Leningrad Med Inst Imeni
Acad I. P. Pavlov, 3 pp

"Zhur Priklad Khimii" Vol XXI, No 8

Discusses experimental data of P'yankov and
Druzhinin on kinetics of reaction of hydrogen
sulfide with MnO_2 , PbO_2 and HgO . Shows that for

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USSR/Chemistry - Reaction Kinetics, of Aug 48
Hydrogen Sulfide (Contd)

all three oxides speed of reduction is commensurable
with diffusion and reaction speeds. Experimental
data is satisfactorily expressed by formula

$$M = \frac{2.3}{t} \log \frac{a-x}{a-x_0} - B \frac{x}{t}.$$

Expresses views on mechanism of reactions. Sub-
mitted 28 Jan 48.

11/49T26

CA KOTINYAN, N.L.

NO. 6

Rate of swelling of lyophilic colloids. A. L. Kotinyan. *Advised. Zhur.* 11, 131 (1910). Cf. A. L. Kotinyan. In steady state, the movement of water toward the grain, detd. by the ratio D/b , and from the grain surface toward its center (detd. by $\cos \theta$, K) are equal. Hence, $\log \{i_0/(i_0 - i)\} - \beta t = Mt$; $M = KD/(bKi_0 + D)$; $\beta = bK/(bKi_0 + D)$; i and i_0 are the degrees of swelling at time t and at infinite time, resp.; D is diffusion coeff. in the swollen layer and b is the thickness of this layer. In agreement with the equation, $(1/t) \log \{i_0/(i_0 - i)\}$ is a linear function of i/t for swelling of gelatin and agar in H_2O (cf. Dumanstik, *et al.*, C.I. 43, 77894) and of starch in H_2O vapor (cf. Rakovskii, *Adsorption Studies*, Moscow, 1913). When $i_0 = \infty$ (as for rubber in toluene), i.e. the solid finally dissolves, the rate of imbibition should be referred to 1 g. of the solid still present rather than to 1 g. of the original solid; this rate is sometimes independent of the degree of swelling. J. J. Bikerman

KOTIMYAN, A.L.

CA

Kinetics of oxidation-reduction potentials VI. A. I. Kotimyan. *Zhur. Obshch. Khim.* 19, 648 (1946) (Engl. translation), *Chem. U.S.S.R.* 10, 401 (1946). The capil. curves obtained by R. et al. (C.A. 40, 8170) for the rate of establishment of the equil. oxidation-reduction potential Tl^{+3}/Tl^+ are interpretable by the reaction $Tl^{+3} + 2H \rightleftharpoons Tl^+ + 2H^+$ following the rate law $-d[H]/dt = k_1[H][Tl^{+3}] - k_2[H]^2$, i.e. with the left-to-right reaction being of the 1st order in $[H]$. By equating the rate of the chemical reaction to the rate of diffusion, and with the approx. relation $[H] = c\Delta E/nF$, where c = capacity of the double layer, taken to be independent of the potential E , and ΔE = difference between the equil. and the momentary E , one arrives, for $k_2 \ll k_1$, at an approx. expression for the rate $W = dE/dt$, of the form $(W/\Delta E) + (k_1\lambda W/DnF) = k_2c_0$, where $c_0 = [Tl^{+3}]$ at the outer face of the liquid film, of thickness λ , adhering to the electrode, and D = diffusion coeff. This equation calls for linearity of $W/\Delta E$ as a function of W , along each of the 3 portions of the kinetic curve, the initial period up to the min. of the rate, the intermediate portion between the min. and the max., and the final portion beyond the max. Along the 1st portion, the slope, $k_1\lambda/DnF$, is independent of $[Tl^{+3}]$, whereas along the 2nd portion it increases with that concn., owing to appearance of a diffuse structure of the double layer. The linear relation holds up to E only 20 mv. from the equil. E . The slope of the 1st portion is independent of the temp., owing to a compensation of the increased rate of reaction by an increase of D and λ . This compensation is no longer complete along the 2nd portion, and, consequently, the slope increases with the temp.

N. Thon

CA 1071944, A.L.

2

Kinetics of the processes of roasting, leaching, washing, and cementation. A. L. Rotinyan and B. V. Dronov. *Zh. Obshch. Khim.* (J. Gen. Chem.) 19, 1843-52 (1949).

A general kinetic treatment applicable to these diverse classes of phenomena is based on the common feature of the reaction taking place at the interface between a solid particle and the gaseous or liquid phase, with the reactants and products having to diffuse across a diffusion layer of growing thickness; depending on whether that layer is highly permeable or impermeable, the rate will be mainly detd. by that of the chem. reaction or of the diffusion, or, in the case of medium porosity, by both. In that general case, the rate expression is $dx/dt = kDSB_0(a-x)/(kx + DSB_0)$, where k = rate const. of the 1st-order chem. reaction, D = mean diffusion coeff. across the reaction rind, S = interface area, v = vol. of reagent, x = concn. of reagent reacted up to time t , μ = coeff. of transition from surface to vol. concn., and $B = x/(SA)$ relates the thickness λ of the rind to the progress of the reaction, x . With the initial conditions $x = 0$ at $t = 0$, integration gives $(1/D) \ln [a/(a-x)] = (\mu x/D) = M$, where $\delta = k/(kx + DSB_0)$, and $M = kDSB_0/(kx + DSB_0)$. In the extreme case of negligible inhibition of the diffusion, i.e. when the rate is detd. by that of the chem. reaction, $D \rightarrow \infty$, hence $\delta \rightarrow 0$, $DSB_0 \gg kx$, $M \rightarrow k$, and the equation goes over into the ordinary 1st-order rate equation. In the other extreme case of very slow diffusion as compared with the rate of the reaction, $DSB_0 \ll kx$, hence $\delta \rightarrow 1/a$, and $M \rightarrow DSB_0/ra$. The inhibition coeff. δ tends to $1/a$ as diffusion is slower; $\delta = 1/a$ would mean $D = 0$, i.e. the reaction comes to a halt at the very surface of the solid particles. In terms of the amt. of solid reacted, with x' denoting the degree of extn. in fractions of the initial amt. ($a = 1$), the general equation becomes $(1/D) \ln [1/(1-x')] = (\delta x'/D) = M$, where $\delta' = \delta a$, the coeff. δ being the no. of moles of the solid reacting with 1 mole of the reagent. The validity of the theory is tested

by the criterion of linearity between $\ln[1/(1-x')]$ and x'/D . Dehydration of alums is an example of a process with no resistance to diffusion and hence detd. merely by the chem. reaction, with the 1st-order $k \sim 0.17 \text{ hr.}^{-1}$, holding up to 90% dehydration. Examples of processes in which chem. reaction and diffusion rate play commensurable roles, and for which the above linearity is shown to hold, are the reduction of Ni aluminosilicate by CO, data of Bogatski (C.I. 41, 7343), with $\delta' = 1.2, 1.1$, and 1.7 , at 600, 700, and 800°, resp., the rise of δ' with the temp. expressing the slower increase of the diffusion as compared with the chem. reaction; chlorination of W ores by liquid S_2Cl_2 , data of Fridman and Bogoraz (C.I. 41, 4421g), with $\delta' = 1.1$ at 100°. Extn. of Pb and Zn from the mixed sulfide ore by gaseous chlorination at 300° appears to be an instance of a purely chem. process, with the 1st-order $k = 0.020$ and 0.013 min.^{-1} for PbCl_2 and ZnCl_2 , resp. The above linearity was further confirmed in numerous instances of oxidizing, sulfating, and reducing roasting. That leaching processes are not necessarily simple 1st-order processes, but are detd. by both the chem. reaction rate and diffusion across the interface layer follows from the frequent inconstancy of the const. calcd. by the simple Fick diffusion equation. This applies particularly to leaching of high- δ minerals. An example is the leaching of natural covellite (CuS) by an acid soln. of $\text{Fe}_2(\text{SO}_4)_3$ for which the above linear relation is found to hold, except at the initial stage where the rind is not yet formed; the effect of increased temp., from 35

to 50°, is due solely to increased rate of the diffusion coeff. In the case of chalcocite (Cu_2S), also leached with acid $\text{Fe}_2(\text{SO}_4)_3$, at 22, 35, and 50°, $\delta' = 1.3, 1.1$, and 2 , resp.; here, the effect of the temp. on the diffusion coeff. is more pronounced only at lower temps., whereas at higher temps. the effect on the chem. reaction rate becomes predominant. With increasing fineness of the

material, the straight lines shift parallel to each other in the direction of higher rates, which again indicates the diffusion character of the kinetics. The theory was further confirmed for the processes of extn. of Au with KCN, and for metal cementation. That 1st-order chem. kinetics are applicable to so great a variety of heterogeneous reactions can be explained only by mechanisms involving several simple steps obeying a 1st-order law, one of which is the rate-detg. step. N. Thon

[U.S. Transl., A 227-309]

C.A. 77, 7166

B
KOTINYAN, A. L.

Hydrate Formation During Electrolysis of Nickel.
by Russian) A. L. Kotinyan and V. Ya. Zeldes.
Zhurnal Prikladnoi Khimii [Journal of Applied Chemistry], v. 23, July 1950, p. 717-727.

Influence of concentration of component parts of the electrolyte for electrolytic refining of Ni on pH of the electrolyte at the beginning of hydrate formation was investigated. Effects of additions of Na_2SO_4 , NaCl and H_2BO_3 are tabulated and charted. 10 ref.

AS 55 A METALLURGICAL LITERATURE CLASSIFICATION

ROTINYAN, A.L.

4

The formation of hydroxides during the electrolysis of
nickel. A. L. Rotinyan and V. Ya. Zel'des. *J. Appl.
Chem. USSR*, 23, 757-63 (1950) (Engl. translation).
See C.A. 44: 8748d. R. M. S.

1952

Hydroxide formation under conditions of electrolysis of nickel. A. I. Rotwilk and V. Ya. Zolotarev. Zh. Priklad. Khim. 23, 936-41 (1970); of. Khim. 44, 8748. The beginning of formation of hydroxide in a Ni-plating bath of the compn. $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$, Na_2SO_4 , 40, and NaCl 5 g/l., with various amts. of CuSO_4 (and in an analogous bath with H_2BO_3 20 g/l.) at 50° was investigated by electrometric titration with alkali on a glass electrode and by observation of the Tyndall cone. With only 0.04 g. CuSO_4 , the titration curve is not distinguishable from that of beginning hydroxide formation is considerably lower than in the pure Ni bath. From Cu 0.60 g./l. upwards, the titration curves, after reaching the pH of begin-

ning hydroxide formation, pass through a max., on further addition of alkali Cu hydroxide is formed at a somewhat lower pH than initially. A similar max. was found also in Cu-rich Ni baths contg. H_2BO_3 , but the pH of pptn. of $\text{Cu}(\text{OH})_2$ is considerably lowered. With $\text{Fe}_2(\text{SO}_4)_3$ 10.008-1.0 g./l. added to the Ni bath, the hydroxide $\text{Fe}(\text{OH})_3$ remains in a colloidal state and is not coagulated until $\text{Ni}(\text{OH})_2$ begins to ppt. With high contents of FeSO_4 , a max. is observed on the titration curves, as with Cu, being possibly due to initial formation of very fine particles of hydroxide which absorb H^+ ions and releases them as the particles become increasingly coarser. Another possible explanation is initial formation of less-basic colloidal particles which then change into more-basic micelles.

N. Thon

ROTINYAN, A.L.

M

*Periodic Phenomena During Anodic Solution of Nickel. A. L. Rotinyan and I. A. Kasavin (Zhur. Fiz. Khim., 1980, 54, (1), 106-110; C. Abstr., 1980, 44, 4804). [In Russian]. Potential oscillations occur in a nickel anode immersed in NiSO_4 , 79, Na_2SO_4 , 40, H_2BO_3 , 20 g./l. only if either NaCl (e.g. 3 g./l.) or H_2SO_4 (to pH 0.3) is added to the solution. The amplitude is, e.g. 0.7 V. and the period is, e.g. 75 sec. at 18° C. and 10 sec. at 50° C. Often, oscillations start after some hours of electrolysis. The oscillations die down within a few hours, if the anode was previously heated in air to 900° C. or in hydrogen to 800° or 1000° C. No oscillations occur if the anode is heated in nitrogen to 800°-1200° C. or is made of remelted electrolytic nickel. Superimposed A.C., when its intensity is greater than that of the D.C., increases the period of oscillation and makes the oscillation less symmetrical. At 50° C. the effect of A.C. is smaller than at 22° C. A passivating film on the anode cannot explain these results. Presumably, these periodic phenomena are determined by the structure of the anode and the hydrogen concentration in it.

ROTIYAN, A. L.

*Hydroxide Formation under Conditions for the Electrodeposition of Nickel. [—III]. A. L. Rotiyev and V. Ya. Zel'ner. *Prilozh. Khim.*, 1951, 24 (6), 601-609. (In Russian). The conditions under which hydroxide begins to form in Ni-plating baths have been studied by the methods used previously (*ibid.*, 1950, 23, 717, 936; *M.A.*, 20, 863). At 50° C. in soln. contg. 38 g./l. NiSO_4 , hydroxide formed at pH 5.3, but when buffered (0.16 mole/l.) with H_2BO_3 at pH 4.3; and with $(\text{NH}_4)_2\text{SO}_4$ at 3.5. In similar soln. of $\text{Ni}(\text{NO}_3)_2$, the corresponding pH values were 4.3, 3.3, and 3.3; in NiCl_2 , 4.0, 3.4, 3.0, and with NH_4Cl as buffer, 3.3. Hydroxide formation was not observed with $\text{Ni}(\text{NO}_3)_2$ soln. contg. 0.18 mole/l. NH_4Cl or NH_4NO_3 . At 50° C., with soln. contg. (g./l.) Ni 38, NaCl 5, Na_2SO_4 40, and $(\text{NH}_4)_2\text{SO}_4$ 0, 10, 20, 40, the limiting pH values were 5.2, 3.0, 3.0, and 3.4, resp. Addn. of H_2BO_3 did not cause such a sharp reduction. The solubility product (L_s) for the formation of solid hydroxide has been calculated from the experimental data; as the Ni concentration increased from 0.05 to 61 g./l., L_s decreased to 1/17 of the initial value (1/2 on using the apparent degree of dissociation of NiSO_4). The theoretical linear relationship between the limiting pH and the log of the activity of the Ni^{++} ions held only for very dilute soln.; at higher concentrations, the pH was greater than the theoretical. The linear relationship was observed for the formation of hydroxides of impurity metals (Cu, Fe^{++} , and Fe^{+++}). In dilute soln. of NiSO_4 , the hydroxide will be formed, in conc. soln. difficultly soluble Ni basic salts. The increased hardness of deposits from soln. contg. $(\text{NH}_4)_2\text{SO}_4$ is attributed to a greater amount of $\text{Ni}(\text{OH})_2$ in the near-cathodic layer.—G. V. E. T.

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Rotinyan, A.L.

R. P. H. F.
 *Gases in Electrolytic Nickel. E. Sh. Ioffe and A. L. Rotinyan (Doklady Akad. Nauk S.S.S.R., 1951, 77, (1), 11-12; in Russian). Discrepancies in the published data on gases in electrolytic Ni can be explained if it be supposed that the so-called gases are really present as organic compounds adsorbed from the bath during deposition. On heating or melting, H, CO, CO₂, and possibly hydrocarbons will be liberated, but the relative amounts produced will depend on the conditions. This hypothesis was verified by analysing Ni deposits with various C contents for H (by vacuum fusion) and O (by H reduction). On plotting the O or H contents (in vol. of gas at 20° C./vol. of Ni) against the C content (wt. %), straight lines were obtained. That for O passed through the origin (i.e. O content \propto C content), but for H the graph showed that there was also a small amount (~ 1.8 vol. H/vol. Ni) of inorganic H present.
 G. V. R. T.

USSR/Chemistry - Electrolytic Refining 21 Jan 52
of Metals

"Principles of Joint Ion Discharge and Theory of Electrolytic Refining of Metals," V. L. Kheifets, A. I. Rotinyan, Leningrad State University A. A. Zhdanov and Inst of Nickel, Cobalt, and Tin Ind

"Dok Ak Nauk SSSR" Vol LXXXII, No 3, pp 423-426

A study is made of the joint electroplating of 2 or more ions having different rates of electro-deposition. If A_1 is the density of ion-flow in gram-atoms per sq cm per sec, K_1 the diffusion rate const of ions of type 1, and C_1 the concn of

211735

type 1 ions added to the soln, then $A_1 = \frac{100 K_1 C_1}{J}$, where J is the total density of flow. The eq is checked experimentally by adding ions of copper, zinc, and cobalt to a soln from which Ni is deposited on the cathode. The resulting linear curves of A_1 vs C_1 support the eq.

211735

ROTINYAN, A. L.

ROTINYAN, L.A.

Plotting three-dimensional three-membered mechanisms. Trudy Sem.
po teor.mash. 14 no.53:11-19 '53. (MLRA 7:3)
(Links and link-motion)

Rotinyan, A. L.

USSR/Chemistry - Physical chemistry

Card 1/1 Pub. 147 - 12/26

Authors : Rotinyan, A. L.; Zel'des, V. Ya.; Ioffe, E. Sh.; and Kozich, E. S.

Title : Potential of Ni deposition and the theory of the retarded ion discharge

Periodical : Zhur. fiz. khim. 28/1, 73-80, Jan 1954

Abstract : The polarization curves for Ni-deposition were measured and the cathode discharges along the metal were determined as a function of pH at different NaCl concentrations in the electrolyte. The potentials originating as result of NaCl addition to the solution were calculated by means of two separate methods. The effect of the Ni-ion activity in the electrolyte on the potential of Ni-deposition is explained. The results obtained were compared with the theory of the retarded discharge and found in perfect agreement with it. Twenty-four references : 21-USSR; 1-USA and 2-German (1916-1952). Table; graphs.

Institution :

Submitted : March 5, 1953

ROBINYAN, A. L.

Chemical Abst.
Vol. 48
A pr. 10, 1954
Electrochemistry

Current efficiency in the electrolysis of fused salts. A. L.
Robinyan, Zhur, Priklad. Khim. 26, 1085-9 (1954).
Polemic in reply to Abramov (C.A. 46, 5405c.). R. D. M.

ROTIKYAN, L. A.

Mathematical Reviews
May 1954
Mechanics

(2)
Rotikyan, L. A. Dynamic synthesis of double-cam mechanisms. Akad. Nauk SSSR. Trudy Sem. Teorii Mashin i Mechanizmov 10, no. 40, 62-84 (1951). (Russian)

234

ROTYNAN, A. L.

USSR/Chemistry - Isobaric Potential Calculations

Card : 1/1

Authors : Kheyfets, V. L., and Rotinyan, A. L.

Title : Isobaric Potentials of the Formation of Hardly Soluble Hydroxides and Basic Salts and pH Solutions, which Are in Equilibrium with the Solid Phase.

Periodical : Zhur. Ob. Khim, 24, Ed. 6, 930 -936, June 1954 .

Abstract : The possibility for the calculation of standard isobaric potentials in the formation of basic salts and pure hydrates is shown by measuring the pH of solutions, which are in equilibrium with the solid phase of basic salts or pure hydrate. Experiments showed that basic salts form in almost all cases at greater concentrations. Pure hydrates form only in the case of zinc at small basic concentrations of its ions. Standard isobaric potentials were computed for reaction of formation of basic salts of many metals. Eighteen references. Tables, graphs.

Institution : The Lensoviet Technological Institute, Leningrad

Submitted : December 24, 1953

ROTINYAN, A. L.

USSR/ Chemistry Analysis methods

Card : 1/1 Pub. 151 - 5/33

Authors : Rotinyan, A. L., Kheyfets, V. L., Kozich, E. S., and Kalnina, E. N.

Title : Composition of almost insoluble Ni-compounds deposited by alkali in a sulfate solution and standard isobaric potentials of their formation

Periodical : Zhur. ob. khim. 24/8, 1294 - 1302, August 1954

Abstract : The compositions of almost insoluble Ni-salts formed during the reaction of NiSO_4 solutions with alkali solutions, were determined by analyzing the $\text{pH} - \lg a^{\pm}$ curves. The results obtained were re-checked by analyzing the electro-conductivity curves of mother liquors during the deposition of the basic Ni-salts with alkali. The standard isobaric formation potentials of these compounds and the standard isobaric addition potential of Ni-sulfate to nickelous hydroxide, resulting in the formation of $3\text{NiSO}_4 \cdot 4\text{Ni}(\text{OH})_2$, were calculated. Twelve references: 9 USSR; 2 USA and 1 Czech (1936 - 1954). Table; graphs.

Institution :

Submitted : March 19, 1954

ROTINYAN, A.L.

USSR/Chemistry

Card 1/1 : Pub. 151 - 2/42

Authors : Kheyfets, V. L.; Rotinyan, A. L.; Kozich, E. S.; and Kalnina, E. N.

Title : Composition of hardly-soluble compounds separated out by alkali from Ni-salt solutions in the presence of boric acid

Periodical : Zhur. ob. khim. 24/9, 1486-1490, Sep 1954

Abstract : During the separation of Ni from mixed nickel sulfate and boric acid solutions, by means of alkali, the composition of the solid phase at the beginning of its formation was investigated by the potentiometric titration method. The composition of the solid phase, which was found to be in equilibrium with the solution, is described. Standard isobaric potentials of the formation of nickel diborate from ions and from nickelous hydroxide and boric acid, were computed. The effect of 50° temperature on the change in composition of the forming solid phase, is explained. Six USSR references (1950-1954). Tables; graphs.

Institution : ...

Submitted : March 19, 1954

ROTINYAN, A.L.; KHEYFETS, V.L.

Simultaneous discharge of simple cations. TSvet.met. 27 no.2:24-33
Mr-Ap '54. (MIRA 10:10)
(Electrometallurgy)

ROTINYAN, A.L., prof., doktor tekhn.nauk

"Economizing electric power in the electrolysis of zinc and copper"
by A.V.Troianovskii. Reviewed by A.L.Rotinian. TSvet.met.28
no.3:70-72 My-Je '55. (MIRA 10:11)
(Zinc--Electrometallurgy) (Copper--Electrometallurgy)

RODINYAN, A. L.

4

CH Cathode-film acidity during the electrolysis of aqueous
solutions. V. L. Khefets, A. L. Rodinyan, and T. M.
Ovchinnikova. *J. Appl. Chem.* 28, 457-60
(1955) (Engl. translation).—See C.A. 49, 15561a.
B. M. R.

(2) [signature]

AID P - 3420

Subject : USSR/Chemistry

Card 1/1 Pub. 152 - 5/18

Authors : Kheyfets, V. L., A. L. Rotinyan, and T. M. Ovchinnikova

Title : Cathode-film acidity during the electrolysis of aqueous solutions

Periodical : Zhur. prikl. khim., 28, 5, 480-483, 1955

Abstract : The measurement of the pH of the cathodic film with a glass microelectrode at a minimum distance from the cathode is described. It is experimentally difficult to use this method, and the data obtained do not represent the exact pH-values. One table, one diagram, 17 ref., 9 Russian (1936-1954).

Institution : None

Submitted : Mr 20, 1954

ROTIANYAN, A.L.

USSR/Chemistry - Conversion processes

Card 1/1 Pub. 22 - 18/54

Authors : Ovchinnikova, T. M.; Ioffe, E. Sh.; and Rotinyan, A. L.

Title : Conversions of $\text{Co}(\text{OH})_2$ during heating

Periodical : Dok. AN SSSR 100/3, 469-471, Jan 21, 1955

Abstract : The characteristics of the conversions of cobaltic hydroxide ($\text{Co}(\text{OH})_3$) and cobaltous hydroxide ($\text{Co}(\text{OH})_2$) were investigated during heating at temperatures of 920° - 1100° . The investigation was conducted by the thermographic method which is supposed to offer a more detailed picture of this conversion phenomenon. The four endothermal effects occurring at various temperatures are discussed. The products obtained from the conversion of $\text{Co}(\text{OH})_3$ and $\text{Co}(\text{OH})_2$ are described. Five references: 2 USSR, 1 USA, 1 Italian and 1 German (1929-1954). Graphs.

Institution :

Presented by : Academician A. G. Betekhtin, August 11, 1954

ROTINYAN, A.L.; IOFFE, E.Sh.; KOZICH, Ye.S.; YUSOVA, Yu.I.

Influence of hydrogen on mechanical properties of electrolytic nickel.
Dokl. AN SSSR 104 no.5:753-755 O '55. (MLRA 9:2)

1. Predstavleno akademikom A.N. Frumkinym.
(Nickel plating) (Hydrogen)

S/081/60/000/003/001/005

Translation from: Referativnyy zhurnal, Khimiya, 1960, No. 3, p. 107, # 8420

AUTHORS: Kneyfets, V. L., Rotinyan, A. I.,

TITLE: The Simultaneous Discharge of Ions and the Problem of Obtaining Metals of High Purity

PERIODICAL: Tr. 4-go sveshchaniya po elektrokhimii, 1956, Moscow, AN SSSR, 1959, pp. 40-446

TEXT: Based on the theory of delayed discharge, various types of regularities of the simultaneous discharge of cations are considered under the condition that the rate of discharge of one type of ions is by several orders higher than that of all others, i. e., as applied to the production of metals with a high degree of purity. The character of the regularity depends on the stage determining the separation of the impurity and the base metal (PZhKhim, 1959, No. 15, 52783).

Z. Solov'yeva

✓ A

Card 1/1

ACTINY

specific volumes of two coarsely dispersed binary systems: Al-S;
Al-ZnO. Zhur. neorg. khim. 2 no. 336-340 Apr '55. (MIRA 10:2)

. Khimicheskii sel'skokhozyaystvennyi institut.
(Systems (Chemistry))

SOV/137-58-7-14567

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 7, p 89 (USSR)

AUTHORS: Rotinyan, A.L., Kheyfets, V.L.

TITLE: ~~Production of Very High-purity Cathodic Nickel~~ (Polucheniye osobo chistogo katodnog nikelya)

PERIODICAL: Materialy Soveshchaniya po vopr. intensiv. i usoversh. dobychi i tekhnol. pererabotki medno-nikelevykh i nikelovykh rud. 1956 g. Moscow, Profizdat, 1957, pp 195-203

ABSTRACT: The fundamentals of an electrochemical method of very high bulk purification of the Ni electrolyte (E) from a number of impurities are set forth. The essence of the method consists of purifying the Ni bath by prior electrolysis. The method has been checked out in the electrolysis departments of the Yuzhuralnikel' and Severonikel' Kombinats. Electrolysis was conducted in standard electrolysis baths, divided by brick partitions into 4 or 5 chambers; the temperature was 60°C, the pH 4.5-5.0, and stirring of the E was done by air. The anodes were insoluble (graphite). Acidity was neutralized by Ni carbonate derived from the purified E. After purification in the baths a filter press was used to filter out the black hydrates.

Card 1/2

SOV/137-58-7-14567

Production of Very High-purity Cathodic Nickel

and the E were then delivered to the cathode cells for Ni electrolysis. In the Yuzhuralnikel' experiments, cleaning was run 7.5-11 times with circulation of 250 liters per hour per bath and 3 to 4 times with circulation of 350-400 liters per hour per bath. At Severonikel' it was run 26 times at 300 liters per hour, 7 times at 600 liters per hour, and 5 times at 860 liters per hour. The high degree of purification at Severonikel' is explained by the superior organization of the stirring and the separation of the bath into a *larger number of chambers (5)*. *The following are features of the electrochemical method of refining:* 1) the possibility of removing from the E in a single operation all impurities deposited at the cathode at maximum current; 2) the possibility of purifying the solution to a high degree; 3) the fact that the method requires no special equipment and is performed in ordinary electrolysis baths with standard filter equipment. It is recommended that the method also be used in the very high purification stage.

N.P.

1. Nickel--Production 2. Nickel--Purification 3. Electrolysis--Applications

Card 2/2

ROTINYAN, A. L.

Effect of conditions of electrolysis and the composition of the electrolyte on the porosity of electrolytic nickel coatings. A. L. Rotinyan, N. E. Fedotkin, B. E. Mishchenko, and Du-Kho De. *Zhur. Priklad. Khim.* 30, 716-723 (1957). The effect of several variables of electrolysis and different concns. of the electrolyte on the porosity α of Ni deposits was detd. with a reference electrolyte contg. $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$ 166, H_2BO_3 30, $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ 50, $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ 20, and NaCl 20 g./l. with Ni anodes and Cu and Fe cathodes. α decreased with: (a) the thickness of the deposit up to a thickness of 20 μ and then approached a const. value; (b) the increase in temp. approaching const. values at 50°. α passed through a min. at a cathodic c.d., D_c , of 5 amp./sq. dm.; a NiSO_4 concn. of 0.7-0.9 M; H_2BO_3 concn. of 0.46 M; and a pH of 4-5. α increased continuously with the concn. of NaCl , MgSO_4 , and Na_2SO_4 , and sharply with Pb above 0.02, with Zn above 0.06, and with Cu above 0.08 g./l. The best conditions and concns. were summarized as follows: a deposit thickness of 20 μ with a D_c of 1.5 amp./sq. cm. at 50° with an electrolyte contg. $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$ 220, NaCl 10 (or NiCl_2 10-15), and H_2BO_3 30 g./l. at a pH 4.2-4.6. These deposits had the lowest α and the highest resistance to corrosion. I. Benavente.

4E2C
4E4j

Am PJ 003

ROTYN, A. L.

6
FE2C

Simultaneous discharge on the cathode of ions of the principle metal and the impurities in the electrolytic refining of cobalt. A. L. Rotyn, V. L. Khelsetz, and A. M. Yakovleva. *Zhur. Priklad. Khim.* 30, 1087-96 (1957). Simultaneous deposition of Co and impurities during its electrolytic refining was studied theoretically and experimentally. For cells with an electrolyte flowing at a rate Q the equation given previously (C.A. 49, 11467e) assumes the form $A_i = 100 K_{ci} Q C_{ci} / (\eta J (Q + K_{ci}))$ by substitution of the material balance relation $C_{ci} = Q C_{ci} / (Q - K_{ci})$ for C_i ; where A_i is the impurity content in the deposit, C_{ci} and C_i are the concns. of impurity in the electrolyte entering and within the cell, resp.; K_{ci} is the convection-diffusion const; η and J are the cathodic current efficiency and c.d., resp. When $Q \rightarrow \infty$, $Q \gg K_{ci}$ and $C_{ci} \approx C_i$. But when $Q \ll K_{ci}$, then A_i vs. Q and C_i are linear functions with different slopes. The line A_i vs. C_i is either above or below the line A_i vs. Q depending on the relation of the rates of deposition and K_{ci} . For Co contg. Cu, Zn, or Pb the former is above the bisecting line A_i vs. Q . The Pb content in the deposited metal decreases with J . I. Bengowitz

MT-788 R

Rotinyan, A.L.
ROTINYAN, A.L.; ALOYTS, V.M.

~~Gas filling~~ in the electrolysis of water. Zhur.prikl.khim. 30
no.12:1781-1785 D '57. (MIRA 11:1)

1.Kafedra elektrokhimii Leningradskogo tekhnologicheskogo instituta
imeni Lensoвета.

(Water--Electrolysis) (Gases)

RO TIN YAN, H. L.

Distr: 4E1j

The effects of current density, temperature, and sulfuric acid concentration on the hydrogen overvoltage on zinc. 27 9
A. L. Rotinyan, N. P. Pedotcy, and Sok-Li Un (Leningrad Inst. Technol., Leningrad). Zhur. Fiz. Khim. 31, 1295-303 (1957). The H overvoltage in a H₂ atm. was measured by using carefully purified H₂O, H₂SO₄, and Zn in 0.01-6N acid solns. at 20, 40, 60, and 80°. At high c.d. of the polarizing current the overvoltage was linearly related to the c.d. but was independent of the acid concn. up to N H₂SO₄; it was lower at higher acid concns. The values of the angular coeffs. were $2.3RT/\alpha F$, where $\alpha = 0.5$, and was a const. independent of concn. and temps. The quant. data on acid concn. agreed with the theory of slow-ion discharge when $i_d = i_0$, where i_0 is the strength of the cathode current ($i_d = i_0 + i_1 - i_2 - i_3$, where i_1 was the H⁺-ion discharge current; i_2 the H⁺-atom ionization current; i_3 and i_4 the corresponding values for the metal). When the polarizing c.d. dropped to below a certain value, the overvoltage dropped suddenly, reaching a value where the overvoltage became independent of the c.d. The sudden drop in overvoltage was at higher c.d. the higher the acid concn. and temp., and was explained by the start in the Zn dissoln. The rate of the Zn soln. increased as an exponential function of the H₂SO₄ activity, as demanded by the slow-ion-discharge theory. The const. of the soln. velocity increased exponentially with temp. The soln. activation energy was 4600 cal/mol. The theoretical slope of the lines was 35-41 v. when $i_d = i_0$, while the exptl. value was 25-30 v., an agreement which was considered satisfactory as a 1st approximation. W. M. Sternberg

Rotinyan, A. L.
USSR / Physical Chemistry - Electrochemistry.

B-12

Abs Jour : Referat. Zhurnal Khimiya, No.1, 1958, 571.

Author : V.M. Kochegarov, A.L. Rotinyan, N.P. Fedot'yev.

Inst : Lensovet Institute of Technology, Leningrad.

Title : Cathode Polarization at Alloy Formation. Study of Co-Ni Alloys.

Orig Pub : Tr. Leningr. tekhnol. in-ta im. Lensoveta, 1957, vyp. 40, 112 - 123.

Abstract : The cathode polarization (CP) at the simultaneous and the separate electrolytic precipitation (E) of Co and Ni was studied at various temperatures and various electrolyte concentrations. It is shown that in case of E from a mixed solution, the partial CP curves at Co precipitation shift to the positive side more sharply than in case of Ni precipi-

Card: 1/2

USSR / Physical Chemistry - Electrochemistry,

B-12

Abs Jour : Referat. Zhurnal Khimiya, No.1, 1958, 571.

Abstract : tation. The simultaneous precipitation of Co and Ni proceeds at temperatures of 20 and 40° more difficultly than the separate one, and depolarization takes place at temperatures of 60 and 70°. It is surmised that depolarization is caused by the formation of a solid solution, and that superpolarization is caused by difficulties in the formation of an overall crystalline lattice. It is shown that the polarization at E of a Co-Ni alloy is determined for both components by the slowing down of the stage of ion discharge; the transfer ratios depend on the electrolyte concentration and rise together with the temperature.

Card: 2/2

SOV/81-59-15-52783

Translation from: Referativnyy zhurnal. Khimiya, 1959, Nr 15, p 69 (USSR)

AUTHORS: Kheyfets, V.L., Rotinyan, A.L.

TITLE: The Joint Discharge of Ions and the Problem of Obtaining Metals of High Purity

PERIODICAL: Tr. Projektn. i n. i. in-ta "Gipronikel", 1958, Nr 1, pp 3-18

ABSTRACT: The principal laws are considered for the joint discharge of ions of the basic metal and admixtures on the cathode applicable to the electrolytic preparation of metals of high purity from aqueous solutions. Starting from the equation of joint discharge the available experimental data in this field are discussed, especially the laws of the change of the concentration of the admixtures in the basic metal depending on their concentration in the electrolyte, on the composition of the solution, the temperature, current density and other conditions for the various metals.

Z. Solov'yeva ✓

Card 1/1

ROTINYAN, A.L., prof.

Experience in the preparation of electrolytic nickel. TSvet. met.
31 no. 7:23-30 J1 '58. (MIRA 11:8)

1. Gipronikel'.

(Nickel--Electrometallurgy)

5(4)
AUTHORS:

Li Un Sok, Rotinyan, A. L., Fedot'yev, N. P.

SOV/76-32-11-8/32

TITLE:

On the Problem of the Overvoltage in the Separation of Hydrogen on Zinc (K voprosu o perenapryazhenii pri vydelenii vodoroda na tsinke)

PERIODICAL:

Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 11, pp 2514-2517 (USSR)

ABSTRACT:

It was already shown (Ref 1) that diagrams of the overvoltage of hydrogen on zinc consist of three parts. At low current densities the polarization curve takes a course parallel to the abscissa, then a rather steep increase of the overvoltage follows, and finally a part that exactly corresponds to the table equation. Experiments carried out with chemically pure zinc at 20°C in 0.05 N sulfuric acid experimentally proved the assumption that at low current densities (Fig 1) the current of the spontaneous decomposition of the zinc cathode determines the course of the overvoltage curve. Investigations at current densities of up to 0.7 Ampere/cm² showed that in the case of sufficiently acid electrolytes (sulfuric acid above 1.0 N) the table equation with a theoretical curve inclination of

Card 1/2

SOV/76-32-11-8/32
On the Problem of the Overvoltage in the Separation of Hydrogen on Zinc

2.3 RT/0.5 F may be used. The size of the true surface exerts a considerable influence on the overvoltage, as it was shown by an anodically polished zinc of the type Ts-0 (Fig 2). The activation energy of the discharge of the hydrogen ions at the equilibrium potential is calculated according to an equation (Refs 2,3) (17.93 kcal/gram molecule). The values of the current exchange of hydrogen on the zinc electrode were calculated (Table 1) and the function of $\lg i$ versus $\frac{1}{T}$ was represented (Fig 3). There are 3 figures, 2 tables, and 3 Soviet references.

ASSOCIATION: Tekhnologicheskii institut im. Lensovet, Leningrad
(Technological Institute imeni Lensovet, Leningrad)

SUBMITTED: April 26, 1957

Card 2/2

SOV/136-59-4-21/24

AUTHOR: Rotinyan, A.L., Professor

TITLE: On the History of the Electrolysis of Nickel Sulphide
Anodes (Ob istorii elektroliza sul'fidnykh nikel'evykh
anodov)

PERIODICAL: Tsvetnyye metally, 1959, Nr 4, p 88 (USSR)

ABSTRACT: The author comments on two English articles (Ref 1 and 2) recently abstracted in "Tsvetnyye metally". He points out that, contrary to statements made there, work on the electrolysis of nickel sulphide anodes was reported as early as 1904 by Günther. More recently, Soviet workers have made significant contributions (Ref 4). There are 9 references, 6 of which are Soviet, 2 English and 1 German.

ASSOCIATION: Gipronikel'

Card 1/1

LI UN-SOK; ROTINYAN, A.L.; FEDOT'YEV, N.P.

Simultaneous discharge of zinc and hydrogen ions. Trudy LTI no.53:98-
101:59. (MIRA 14:3)

(Zinc)

(Electrolysis)

ROTINYAN, A.L.; MOLOTKOVA, Ye.N.; DANILOVICH, O.M.

Connection between cathodic polarization and the crystal structure
of a galvanic iron - cobalt alloy. Izv. vys. ucheb. zav.; tsvet. met.
3 no.4:49-51 '60. (MIRA 13:9)

1. Leningradskiy tekhnologicheskii institut. Kafedra tekhnologii
elektrokhimicheskikh proizvodstv.
(Iron-cobalt alloys—Electrometallurgy)

ROTINYAN, A.L.; KATSMAN, D.G.

Thermal decomposition of nickel carbonyl vapors. Zhur.neorg.
khim. 5 no.1:237-238 Ja '60. (MIRA 13:5)
(Nickel carbonyl)

77510
007/89-55-1-19/89

AUTHORS: Zerklovskiy, A. M., Reiznyan, A. I.

TITLE: Nickel Plating by Means of Thermal Decomposition of Nickel Tetracarbonyl Vapor

PERIODICAL: Zhurnal prikladnoy khimii, 1966, Vol 39, No 1, pp 102-110 (USSR)

ABSTRACT: The authors developed an installation for nickel plating with vapors of nickel tetracarbonyl (see Fig. 1). Fan 1 supplies the gas mixture (nickel tetracarbonyl + CO) to the reactor 2 containing the objects to be plated, heated to a predetermined optimum temperature. Partially exhausted gas goes to the evaporator 3 where it is enriched and restored to its original concentration with liquid nickel tetracarbonyl supplied from storage tank 4 through the dosing apparatus 5. The gas goes then through the expansion vessel 6 to the receiver 7 from which the fan 1 recirculates it. The system is slightly pressurized (50-100 mm water) by means of the gas holder 11 to prevent any air intake.

Card 1/3

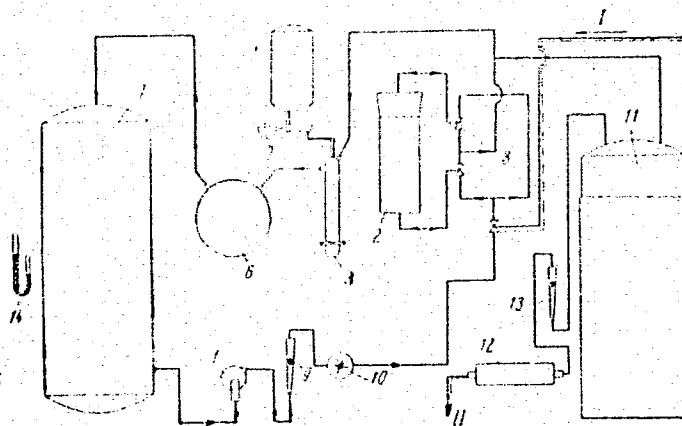
Nickel Plating by Means of Thermal Decomposition of Nickel Tetracarbonyl Vapors

77510

SOV/CO-33-1-19/49

Fig. 1. Installation for nickel plating by means of thermal decomposition of nickel carbonyl vapors.

(1) fan; (2) reacting vessel; (3) evaporator; (4) storage tank; (5) dosing apparatus; (6) expansion vessel; (7) receiver; (8) valves for changing the gas flow direction; (9) rotameter; (10) gasometer; (11) gas holder; (12) furnace; (13) rotameter; (14) manometer.



(I) Pure CO gas for blowing through; (II) excess gas containing no $\text{Ni}(\text{CO})_4$.

Card 2/5

Nickel Plating by Means of Thermal Decomposition of Nickel Tetracarbonyl Vapors

77510

SOV/80-33-1-19/49

The excess pressure due to the large amount of CO liberated on decomposition of nickel tetracarbonyl is reduced by directing a part of the gas to the furnace 12 where it is burned to CO₂ and discharged into the atmosphere. Optima conditions were established, as follows: oxygen content in the gas mixture, 0.4% maximum; temperature, 275 to 285° C at 20 to 25% nickel carbonyl content in the gas mixture; gas velocity around the treated surface, not less than 0.006 m/sec. To assure uniformity of the nickel coating, the direction of the gas flow was reversed every 30 to 60 seconds by means of the valves 8. The thickness of the coating thus obtained varied by ± 2 to 3μ . The coating showed poor adherence to the metal surface; this lack of adherence disappeared after heat treatment under hydrogen at 550-700° C. After such treatment the samples successfully sustained repeated 180° bending. Microphotographic and X-ray investigation showed that the nickel coating has a crystalline β -phase structure with an identity period of 3.517-3.519 Å which is close to the standard

Card 3/5

Nickel Plating by Means of Thermal Decomposition of Nickel Tetracarbonyl Vapors

77510

SOV/80-33-1-19/49

parameter of the Ni cubic face-centered unit cell. The nickel crystal size grew with the concentration of nickel carbonyl in the gaseous phase and varied in the range from 10^{-4} to 10^{-2} cm. The hardness of the heat-treated coating was 240-270, according to Vickers. The porosity was very low, practically nil in coatings of more than 10μ thickness, and their protective properties compared favorably in every respect with those of electroplated ones. The reasons which restrict the wide application of this method are: the toxicity of nickel tetracarbonyl; the difficulties of its transportation over long distances; the necessity of heat treatment of the plated objects; the difficulty of bringing the whole treated surface to a uniform temperature within narrow limits; and the dull appearance of the coating. E. Sh. Ioffe and A. I. Zaslavskiy cooperated in the X-ray investigation; corrosion laboratory tests were made under the supervision of Ye. V. Urnis. There are 7 figures; 1 table; and 16 references, 11 U.S., 5 Soviet. The 5 most recent

Card 4/5

Nickel Plating by Means of Thermal Decomposition of Nickel Tetracarbonyl Vapors

77010

SCC/80-33-1-19/49

U.S. references are: H. A. Toulmin, U.S. Pat. 2685124 (1954); H. Nack, U.S. Pat. 2686535 (1954); O. A. Fink, U.S. Pat. 2682702 (1954); Pat. Application Nr 11438/56; L. W. Owen, Metal Industry, March 21, 227 (1958).

SUBMITTED: June 12, 1958

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5.1310

77642

SOV/80-33-2-17/52

AUTHORS: Rotinyan, A. L., Ioffe, E. Sh.

TITLE: Concerning Extraction of Gases from Electrolytic Nickel

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol 33, Nr 2,
pp 302-308 (USSR)

ABSTRACT: The content of hydrogen, carbon, and oxygen, adsorbed on electrolytic nickel was determined by vacuum extraction at different temperatures to establish the origin of adsorbed gases. Four to eight-gram samples of electrolytic nickel (brand H-1) were heated (after preliminary evacuation) at various temperatures in a glass tube connected to a vacuum system at 10^{-2} mm for 6 hours. The residual gases in these partly degassed samples were then analyzed by vacuum extraction from melted nickel for volumes of H_2 , CO, and CO_2 (for the method see: Yavovskiy, V. I., Medvedeva, G. A., Analysis of Gases and Nonmetallic Inclusions in Steel

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Concerning Extraction of Gases from
Electrolytic Nickel

77042

SOV/30-33-2-17/52

(Opredeleeniye gasov i nemetallicheskich vklyucheniye v
stal) Metallurgizdat, 1945). Content of oxygen was
determined in separate samples by reduction and
subsequent determination of water and final sample
weight. Reproducibility range of 10% was reached.
Table 1 and Fig. 1 show the effect of extraction
temperature upon the volume of residual gases.
(It was assumed that the carbon dioxide forms only by
the reaction $2CO \rightleftharpoons CO_2 + C$ in the cold zones of
apparatus). The volumes of monoatomic carbon and
oxygen were calculated by the formulas (1) and (2)
respectively.

$$r_C = r_{CO} + 2r_{CO_2} \quad (1)$$

$$r_{O_2} = \frac{1}{2} r_{CO} + r_{CO_2} \quad (2)$$

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Concerning Extraction of Gases from
Electrolytic Nickel

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Table 1. Effect of temperature of vacuum extraction
of gases from nickel upon their residual volumes in
the metal.

(1) Temperature of extraction
(in °C); (2) residual content
of gases in nickel (in ml/100 g;
(3) hydrogen; (4) oxygen; (5)
determined by the method of
reduction; (6) calculated by the
formula /2/; (7) carbon monoxide;
(8) carbon dioxide; (9) carbon
calculated by the formula /1/.

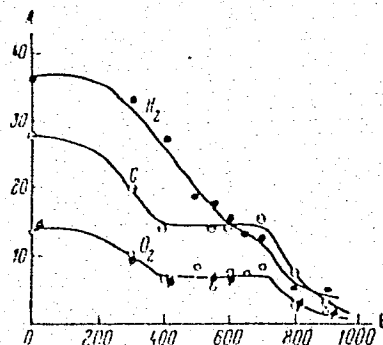
(1)	(3)	(2)		(7)	(8)	(9)
		(5)	(6)			
20	36.0	13.5	14.0	18.0	5.0	28.0
300	33.0	10.5	9.8	14.0	2.8	19.6
400	27.0	6.6	6.1	12.0	1.0	14.0
500	19.0	8.3	—	—	3.7	—
550	17.5	7.3	7.0	9.0	2.5	14.0
600	15.5	7.5	7.2	6.5	4.0	14.5
670	13.0	7.5	—	5.0	—	—
700	12.5	8.3	7.8	3.6	6.0	15.6
800	5.4	3.8	3.7	3.5	2.0	7.5
900	5.0	1.5	1.6	3.3	0.0	3.3

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Concerning Extraction of Gases from
Electrolytic Nickel

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Fig. 1. Volume of
gases remaining in
nickel versus
temperature of
extraction. (A)
volume of gases
(in ml/100 g at room
temperature; (B)
temperature (in °C).



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Concerning Extraction of Gases from
Electrolytic Nickel

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In the second series of extraction experiments the content of C, H₂, and O₂ was determined in nickelous deposits prepared at various pH values of the electrolyte containing (in g/l): Ni, 50, H₃BO₃, 20, Na₂SO₄, 40, NaCl, 10. Cathodic current density was 170 amp/m², temperature of electrolyte 55°, the flow speed 60 ml/amp-hr. Table 2 shows the experimental results. The data in both tables show a practically constant carbon-oxygen volume ratio of 2, confirming the assumption that carbon and oxygen are adsorbed on the electrolytic nickel in form of organic compounds of the type (C₆H₁₀O₆)_x and (C₅H₁₀O₅)_x present in solution due to leeching out of wooden parts of the apparatus (Zhurin, A. I., Shoykhet, M. G., Trudy Leningrad. Polytekhn. Inst., 188, 181, 1957) supposing that no colloidal hydroxides are formed in the precipitate (Doklady Akad. Nauk SSSR, 77, 91, 1951). The slope of the

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Concerning Extraction of Gases from
Electrolytic Nickel

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SOV/80-33-2-17/52

Table 2. Content of carbon, hydrogen and oxygen in
cathodic nickel obtained at various pH values of
the electrolyte

(1) pH value of the
electrolyte at 20° C;
(2) content of gases in
nickel (in ml/100 g);
(3) hydrogen; (4) oxygen;
(5) determined by the
method of reduction; (6)
calculated by the formula
/2/; (7) carbon monoxide;
(8) carbon dioxide; (9)
carbon calculated by the
formula /1/; (10) average.

(1)	(2)					(7)	(8)	(9)
	(3)	(4)						
		(5)	(6)					
2.2	41	19	12	18	2.7	23		
2.4	53	13	13	22	2.3	27		
2.7	46	—	11	16	2.5	21		
3.2	58	13	14	25	1.0	27		
3.6	70	—	10	15	2.0	19		
4.0	57	—	10	18	1.0	20		
4.7	58	6	14	20	4.3	29		
5.0	63	14	—	—	—	—		
5.2	72	—	10	16	2.0	20		
(10)	57.6	13	11.8	—	—	23.3		

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Concerning Extraction of Gases from
Electrolytic Nickel

77642

SOV/80-33-2-17/52

volume-temperature curve suddenly becomes horizontal for carbon and oxygen at 400° , indicating that pyrolysis of organic compounds adsorbed in the intercrystalline layers is completed at this temperature. Decomposition of organic molecules situated inside of the nickel crystals starts only after 700° . Hydrogen is adsorbed in both elementary and combined forms and is therefore desorbed continuously, i.e., its curve does not level off because desorption of elementary hydrogen takes place mainly between 400 and 700° (when desorption of gaseous hydrogen is completed) the volume ratio $C:O_2:H_2$ becomes 1:0.83:0.5, i.e., close to the

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composition of hydrolyzed hemicellulose. There is 1 figure; 2 tables; and 12 references, 11 Soviet, 1 Dutch.

ASSOCIATION:

Institute of Nickel, Cobalt, and Lead Industry
(Institut nikelovoy, kobal'tovoy i olovyannoy
promyshlennosti)

SUBMITTED:

July 27, 1959

0.0000

77677
SOV/80-33-2-52/52

AUTHOR: Budnikov, P. P., Filatov, I. G., Rotinyan, A. S.
TITLE: Bibliography
PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol 33, Nr 2, pp
506-512 (USSR)
ABSTRACT: Three new books are listed with an extensive review of
each.

Card 1/1

5.4600

78219
SOV/80-33-3-20/47

AUTHORS: Rotinyan, A. L., Semikozov, G. S.

TITLE: Experimental Checking of the Electrochemical Method
of Removing Impurities From Electrolytes

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol 33, Nr 3, pp
622-627 (USSR)

ABSTRACT: The purification of a nickel electrolyte from copper
admixture was made by a preliminary electrolysis in a
bath equipped with a pure nickel cathode and a graphite
anode. The rate of discharge of the impurity at the
cathode was determined by Eq. (1):

$$I_1 = K_{d_1} \cdot S \cdot C_{i_b} \quad (1)$$

where I_1 is the limiting current; S is the cathode

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Experimental Checking of the Electrochemical
Method of Removing Impurities From Electrolytes

78219
SOV/80-33-3-20/47

surface; C_{i_b} is the concentration of the impurity in the

bath; K_{d_i} is the convective diffusion constant. The

flow of the electrolyte being designated by Q ml/sec
and the original concentration of the impurity in the
electrolyte by $C_{i_{or}}$, the material balance of the

electrolysis can be expressed by Eq. (2):

$$Q \cdot C_{i_{or}} = Q \cdot C_{i_b} + K_{d_i} \cdot S \cdot C_{i_b} \quad (2)$$

from which the following relationship can be derived:

$$C_{i_{or}} / C_{i_b} = 1 + K_{d_i} \cdot S / Q \quad (3)$$

The left side of Eq. (3) characterizes the extent of

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Experimental Checking of the Electrochemical
Method of Removing Impurities From Electrolytes

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the elimination of the impurity from the original electrolyte. However, as some amount of the base metal is also precipitated at the cathode together with the impurity, the degree of purification is better expressed by the relationship:

$$C_{i_{or}}/C_{i_b} : C_{M_{or}}/C_{M_b}$$

where M designates the base metal (in this instance, nickel). As $C_{M_{or}}/C_{M_b} \cong 1$ in all instances, the

ratio $C_{i_{or}}/C_{i_b}$ expresses the degree of purification

with sufficient accuracy. It was established that the degree of purification is governed by the following laws: (a) It does not depend on the pH of the electrolyte for the pH between 0.5 and 4; (b) the value of K_{d_1} , and consequently the degree of purification,

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Experimental Checking of the Electrochemical
Method of Removing Impurities From Electrolytes

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increased 5-fold when the electrolyte was mixed energetically with an air stream; (c) the degree of purification was independent of temperature changes in the range of 10-50° C; (d) the degree of purification increased linearly with the cathode surface; (e) it did not depend on the current density; (f) it decreased with increasing rate of flow of the electrolyte. The value of K_{d1} was constant in all of the experiments; its mean value was $0.38 \cdot 10^{-3}$. There are 8 figures; and 11 Soviet references.

SUBMITTED: October 29, 1959

Card 4/4

S/080/60/033/012/010/024
D209/D305

AUTHORS: Rotinyan, A.L., and Semikozov, G.S.

TITLE: Method of electrochemical purification of an electrolyte and its experimental examination

PERIODICAL: Zhurnal prikladnoy khimii, v. 33, no. 12, 1960,
2712 - 2718

TEXT: This is a report on a series of experiments, performed on the removal of copper impurity from nickel electroplating solution by low current density electrolysis, for investigating the influence of a number of purification tanks, the rate of flow of electrolyte, and the cathode surface on the degree of purification in the continuous treatment, and the influence of duration of purification and air agitation on the degree of purification in the batch treatment, and to prove that the experimental data are in agreement with theoretically derived equations. The present work is a continuation of an earlier investigation by the authors (Ref. ✓

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Method of electrochemical ...

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1: ZhPKh, XXXIII, 3, 622, 1960), A.L. Rotinyan, V.L. Kheyfets (Ref. 2: Tr. inst. Gipronikel', 3, 309, 1958). The arrangement for carrying out the experiments was described in the previous article (Ref. 1: Op.cit.). When low cathode current density is applied, nickel is not deposited from nickel electroplating solution but the copper contained in the nickel solution as impurity is plated out. Low current density purification can be carried out in two ways, either as a batch treatment, or as a continuous treatment. In the continuous treatment the flow of nickel electroplating solution is so arranged that it circulates continuously between the electroplating tank in which nickel plating processes are carried out normally, and between purification tank which copper impurity is removed by low current density electrolysis. The batch treatment is carried out in the main electroplating tank when the solution is not in use, i.e. when the nickel plating is not carried out. The solution maintained for all experiments at the temperature of 20°C contained 127 ± 3 g/liter of nickel and 9.6 ± 0.6 g/liter of copper as impurity. In the previous article (Ref. 2: Op.cit.)

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Method of electrochemical ...

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$$\frac{c_{\text{initial}}}{c_{\text{final}}} = 1 + \frac{K_{g_1} S}{Q} \quad (1)$$

was derived for the degree of purification expressed as the ratio

$\frac{c_{\text{initial}}}{c_{\text{final}}}$ i.e. by the ratio $\frac{\text{the initial concentration of impurity}}{\text{the final concentration of impurity}}$

i.e. $\frac{\text{the impurity concentration in the solution flowing into the}}{\text{the impurity concentration in the solution flowing out of}}$

purification tank

the purification tank, where: K_{g_1} - the coefficient of rate of con-

vection diffusion of impurity ions; S - the cathode surface in the purification tank; Q - the rate of flow of electrolyte through the purification tank. The assumption was made that the nickel concentration during electrolysis was constant and that the impurity concentration in the whole volume of solution is uniform. In case "2"

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when applying several tanks in series of the same dimensions and with cathode surface in each tank S the degree of purification is expressed by the following equation

$$\frac{c_{\text{initial}}}{c_{\text{final}}} = 1 + \left(\frac{K_{\text{Ei}} S^n}{Q} \right) \quad (2)$$

In case "3" when applying several tanks in series by dividing the purification tank into equal compartments with cathode surface $S_n = \frac{S}{n}$ the degree of purification is expressed by the following equation:

$$\frac{c_{\text{initial}}}{c_{\text{final}}} = 1 + \left(\frac{K_{\text{Ei}} S^n}{Q_n} \right) \quad (3)$$

The ratio $\frac{\text{initial nickel concentration}}{\text{final nickel concentration}}$ is practically independent on the number of tanks used in purification, and on the number of Card 4/10

Method of electrochemical ...

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compartments made in one tank. The rate of impurity removal = "w" in the batch treatment is expressed by the equation

$$w = K_{g_i} S c_{\text{final}} \quad (4)$$

and by

$$w = -V \frac{dc_{\text{final}}}{d\tau} \quad (5)$$

where c_{final} - impurity concentration at time " τ "; V - volume of electrolyte in the tank. By comparing Eq. (4) and Eq. (5)

$$-\frac{dc_{\text{final}}}{c_{\text{final}}} = \frac{K_{g_i} S}{V} d\tau. \quad (6) \quad \checkmark$$

After integration

$$\ln \frac{c_{\text{initial}}}{c_{\text{final}}} = \frac{K_{g_i} S \tau}{V}. \quad (9)$$

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Fig. 3 represents the dependence of copper concentration in milligrams/liter on the time of purification in hours by batch treatment in one tank of volume equal to 585 cm³. By plotting

$$\log \frac{c_{\text{initial}}}{c_{\text{final}}}$$

calculated from experimental results represented in Fig. 3, against time of purification, a straight line is obtained which is in agreement with theoretical Eq. (9). In order to compare the efficiency of continuous treatment sufficient to give the same degree of purification as in the batch treatment was calculated. For the chosen operating conditions in the continuous treatment, 2 purification tanks in series with the same cathode surface as in the batch treatments give the same degree of purification expressed by ratio $\frac{c_{\text{initial}}}{c_{\text{final}}}$ as in the batch treatment. In the case of division of the

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purification tank into compartments for the same degree of purification. i.e. if $\frac{C_{\text{initial}}}{C_{\text{final}}}$ is the same in Eq. (3) and Eq. (9)

$$\frac{K_{g_i} S \tau}{V} = n \ln \left(1 + \frac{K_{g_i} S}{Q_n} \right) \quad (12)$$

and

$$\frac{K_{g_i} S}{Q_n} = \ln \left(1 + \frac{K_{g_i} S}{Q_n} \right) \quad (13)$$

Denoting $\frac{K_{g_i} S}{Q_n}$ by x , $x = \ln (1 + x)$, (14); $e^x = 1 + x$, (15); for $x = \frac{\checkmark}{\quad}$

$x = 0$, $n = \infty$. Expanding e^x in series the number of compartment "n" was calculated with 1 % error to be 20. The batch treatment is more efficient but the continuous treatment is recommended for highly

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productive installations where little shut-down time is available for carrying out the batch treatment. Coefficient of convection diffusion K_{g_1} increases thus leading to better purification when air

agitation is improved by increasing the number of holes in the air pipe situated at the bottom of the tank maintaining the same quantity of air passing through the solution in unit time. Air agitation has a lesser effect on the decrease in concentration polarization than that of cathode agitation. It is known that

$$\delta = \frac{1}{u^k} \quad (17)$$

where u - rate of movement of fluid; k - coefficient dependent on the conditions of experiment. For movement of fluid in the laminar layer at the cathode $k = 0.5$. Assuming that the rate of movement of fluid at the cathode is proportional to the amount of air used for agitation

$$\delta = \frac{D}{K_{g_1}} \simeq \frac{1}{u^k} \simeq \frac{1}{\Phi^k} \quad (18)$$

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D209/D305

$$\ln K_{g_i} \simeq k \ln q. \quad (19)$$

By plotting $\log K_{g_i}$ against $\log q$ a straight line is obtained with the slope $k = 0.5$ which proves that air agitation does not move the laminar layer at the cathode. There are 1 table, 5 figures, and 3 Soviet-bloc references.

ASSOCIATION: Kafedra elektrokhemii Leningradskogo technologicheskogo instituta im. Lensovet (Leningrad Technological Institute im. Lensovet, Department of Electrochemistry)

SUBMITTED: June 21, 1960

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Card 9/10

ROTINYAN, A.L.; SHOSHINA, I.A.

Simultaneous discharge of ions of the base metal and impurities during the electrolytic refining of nickel from a chloride solution. Izv. vys. ucheb. zav.; tsvet. met. 4 no.3:50-56 '61. (MIRA 15:1)

1. Leningradskiy tekhnologicheskii institut, kafedra tekhnologii elektrokhimicheskikh proizvodstv.

(Nickel--Electrometallurgy)

(Ion sources)

ROFIMAN, A.L.; KHEIFETS, V.L.; MIRZALOVA, S.A.

Solubility product of $\text{Co}(\text{OH})_2$ and standard redox potential for
 $\text{Co}^{3+}/\text{Co}^{2+}$. Zhur. neorg. khim. 6 no.1:21-26 '61, (MIRA 14:2)
(Cobalt hydroxide)

25389

S/080/61/034/002/009/025
A057/A129

5-1310 (1208.1273.2319)

AUTHORS: Rotinyan, A.L., Parfenova, V.S., Pushkova, R.A., Semikozov,
G.S.

TITLE: Electrochemical method of purifying an electrolyte from
impurities under conditions affected by ultrasonic vibrations

PERIODICAL: Zhurnal Prikladnoy Khimii, v 34, no 2, 1961, 339-344

TEXT: The effect of ultrasonic waves on the electrochemical purification of electrolytes was investigated and a scheme for the removal of iron, copper and cobalt impurities in a nickel electrolyte was presented. It is known that ultrasonic fields decrease the concentration polarization. The present authors demonstrated in previous papers that the intensity of an electrochemical purification is controlled by the diffusion current of the impurity. Thus a favorable effect of ultrasonic waves on electrochemical purification was to be expected. Informational experiments

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A057/A129

Electrochemical method of purifying ...

carried out with nickel chloride and sulfate solutions containing copper impurities approved this assumption, demonstrating that current density of copper deposition increases 10 times if an ultrasonic field is applied in electrolysis. Electrochemical experiments were carried out to purify nickel chloride electrolyses from copper impurities. The multiplicity factor of purification was expressed by $c_i / c_{i0} = 1 + K_{gi} S / Q$ (1), (c_{i0} = concentration of the impurity in the initial electrolyte, c_i = concentration of the impurity in the electrolyte in the tank and the outflowing electrolyte, K_{gi} = constant of the convective diffusion rate of the impurity, S = size of the cathode surface in the purification tank, Q = flowing rate of the electrolyte). Plexiglass tanks (313 x 79 x 76 mm), magnetostriction transformers of the type NM-1.5 (PM-1.5) with 4.5 kw capacity and 23.7 ke/s frequency were used in the experiments, as well as pure nickel anodes of the H-1 (N-1) type under following conditions: initial concentration of nickel chloride 122 ± 2 g/l, 1,000 \pm 70 mg Cu per liter, temperature 40°C and pH 1-2. In the first series of experiments the effect of the flow rate on the purification multiplicity factor was

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Electrochemical method of purifying ...

studied and it was observed (Fig 3) that the latter decreases with increasing flow rate. Further experiments showed that the purification multiplicity factor is neither affected by the cathodic current density nor by the initial copper concentration. Constants of convective diffusion rate were calculated (Tab.) and an almost constant K_{ci} value of about $0.26 \cdot 10^{-2}$ cm/sec was observed, i.e., 24 times greater⁸¹ than the value for corresponding experiments without ultrasonic vibrations. The present authors remark that the degree of intensification obtained is not the maximum, thus further improvements could be realized with optimum conditions. The following scheme suitable for sulfate-chloride as well as pure chloride electrolytes with medium or high nickel content is suggested: The analyte containing Fe, Cu, and Co impurities is purified from Fe in the usual manner (oxidation by air and precipitation of Fe with nickel carbonate and further repulping of the iron). After filtration the solution is transferred into the tank for the first electrochemical purification with ultrasonic vibration. Anodes are soluble and can be manufactured from cuts or defective cathode nickel. Electrolysis is carried

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Electrochemical method of purifying ...

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S/080/61/034/002/009/025
A057/A129

out at current densities for copper and not nickel deposition, and at a voltage of maximum 1.5 v. All precious metals will be deposited together with copper and are processed in the copper-electrolysis plant. Then the electrolyte is transferred from the first tank to the second which works also with ultrasonic waves. Here graphite anodes were used and a copper-nickel alloy is deposited on the cathode. This alloy containing about 0.5% Ni is transferred to further treatments. Chlorine is formed on the anode and oxidizes Co^{2+} . Adding nickel carbonate, cobalt hydroxide is precipitated. This procedure of cobalt extraction is used in the kombinat "Yuzhuralnikel" (Combine "Yuzhuralnikel") (Ref 13: A.L. Rotinyan, Tsvet. met., 7, 23 (1958) with the difference that in the present work in the second tank copper is separated. Concluding the present authors thank N.L. Amatuni for the help in the present work. There are 6 figures, 1 table and 14 Soviet-bloc references.

ASSOCIATION: Kafedra elektrokhemii Leningradskogo tekhnologicheskogo instituta imeni Lensovet (Department for Electrochemistry of the Leningrad Technological Institute imeni Lensovet)

Card 4/6

KHEYFETS, V.L.; ROTINYAN, A.L.; KALGANOVA, O.P.; LEVENFISH, P.G.

Rules of a simultaneous electrochemical discharge of a basic metal
and admixtures, the depolarization effect taken into account. Zhur.
prikl.khim. 34 no.7:1519-1528 J1 '61. (MIRA 14:7)
(Electroplating) (Polarization (Electricity))

FEDOT'YEV, N.P.; ROTINYAN, A.L.

"Electrolysis of sodium chloride solutions" by L.S.Genin. Reviewed by
N.P.Fedot'ev, A.L.Rotinian. Zhur.prikl.khim. 34 no.7:1649-1650
Jl '61. (MIRA 14:7)

(Sodium chloride) (Electrolysis)
(Genin, L.S.)

ROTINYAN, A.L.; GAL'NBEK, A.A.; SUROVTSEVA, S.P.

Current efficiency in the electrolysis of fused salts. TSvet.
mat. 3/4 no.10:40-45 0 '61. (MIRA 14:10)

1. Leningradskiy tekhnologicheskii institut imeni Lensoveta.
(Nonferrous metals--Electrometallurgy)

S/076/61/035/001/010/022
B004/E060

AUTHORS: Rotinyan, A. L. and Molotkova, Ye. N.

TITLE: Cathodic polarization at a joint discharge of ions of iron, cobalt, and hydrogen

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 1, 1961, 158-163

TEXT: A study has been made of the cathodic polarization during the formation of an Fe - Co alloy under conditions where hydrogen is already liberated. Curves of partial polarization were drawn for the purpose. The curve of total polarization was drawn, and the current fraction of the two components was determined for each potential by a chemical analysis. The curve of partial polarization was drawn therefrom for each component. The electrolyte was a solution of 0.63 mole/l CoSO_4 , 0.62 mole/l FeSO_4 , 10 g/l NaCl, 30 g/l boric acid. The experiments were conducted for pH 3.5, 1.8, and 1.5. The volume of hydrogen liberated was measured. In addition to determining the current fraction consumed for the separation of the metals and of H_2 , the authors also calculated, from the difference,

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Cathodic polarization at a joint ...

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the current consumption for the $\text{Fe}^{3+} \rightarrow \text{Fe}^{2+}$ reduction. It was found that in the whole potential range investigated, the alloy deposited under depolarization of iron and superpolarization of cobalt. Electrolysis follows the Tafel equation $\varphi = a + (2.3RT/\alpha zF) \log i$ (1) (φ = cathode potential, a = cathode potential for $i = 1$, α = constant). The values for a and α are given in Table 1 for 1 a/dm², various pH and temperatures. Experimental results fit the assumptions of the theory of slow ion discharge. The polarization curve of H_2 , as a function $\varphi = f(\log i_{\text{H}_2})$, was found to be a straight line with the inclination angle $2.3RT/\alpha zF$. The exchange current on the cobalt-iron alloy was calculated, and the following results were obtained for $\log I_0$ (a/cm²): -5.55 at 25°C; -5.23 at 40°C; -4.92 at 55°C. The activation energy of the discharge of H^+ ions amounted to 9.1 kcal/mole. At pH = 3.5 the whole current is consumed for the discharge of Co and Fe ions. An increase of acidity entails not only the liberation of H_2 , but also a further process, which was identified as $\text{Fe}^{3+} \rightarrow \text{Fe}^{2+}$. The appearance of Fe^{3+} in the solution is caused by an increase of the oxidation potential of O_2 in strongly acid solution. A. N. Frumkin and L. I. Antropov are mentioned. There are 6 figures, 3 tables, Card 2/4